Nov. 9, 1954 S. M. KASS 2,693,600

FLUSH TANK VALVE

Filed Dec. 28, 1951

Fig. 1.

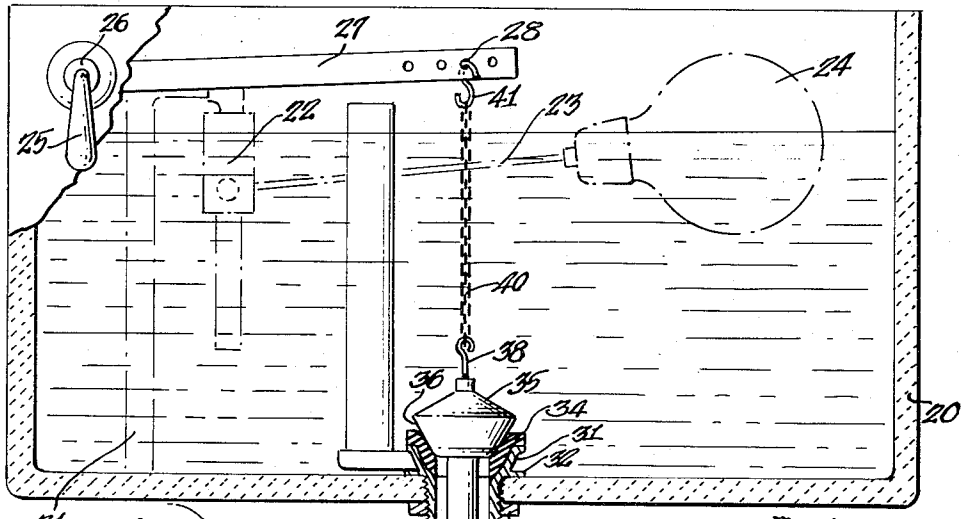


Fig. 2.

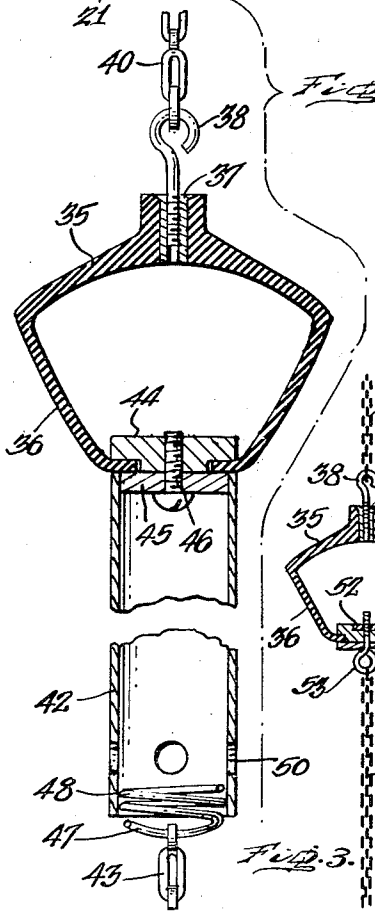


Fig. 3.

Fig. 4.

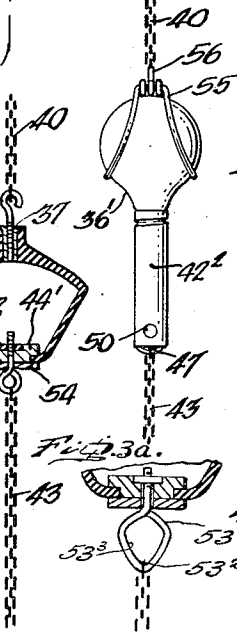


Fig. 3a.

Fig. 5.

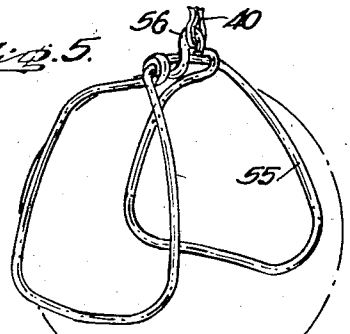
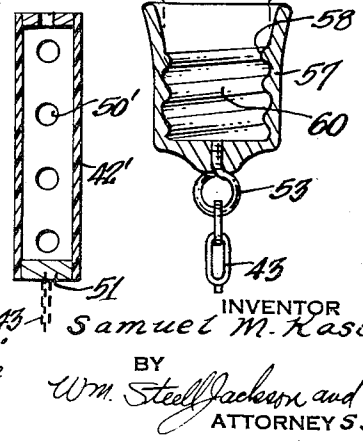


Fig. 6



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FLUSH TANK VALVE

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1 Claim. (Cl. 4—56)

The present invention relates to a flush tank outlet valve and particularly to the manner of centering and guiding the valve.

A purpose of the invention is to eliminate the usual guide rod and guide of a flush tank outlet valve, and to guide the valve and keep it centered as it seats by a guiding extension through the outlet valve seat and into the drain fitting.

A further purpose is to employ the hydraulic effect of the water leaving through the drain fitting to keep the valve centered as it seats.

A further purpose is to extend a chain from the outlet valve through the drain fitting and use the effect of the water on the chain to keep the valve centered.

Further purposes appear in the specification and in the claim.

In the drawings I have chosen to illustrate a few only of the numerous embodiments in which my invention may appear, selecting the forms shown from the standpoints of convenience in illustration, satisfactory operation and clear demonstration of the principles involved.

Figure 1 is a front elevation partly in vertical sections of a flush tank showing the outlet valve of the invention. The inlet valve is also shown in phantom.

Figure 2 is a fragmentary axial section of the outlet valve of the invention.

Figure 3 is an axial section of a variant outlet valve, showing the preferred embodiment.

Figure 3*a* is a fragmentary side elevation of a variant form of chain attachment.

Figure 4 is a still further variation shown in elevation.

Figure 5 is a fragmentary axial section of a still further variation.

Figure 6 is an axial section of a variant form of depending centering element.

Describing in illustration but not in limitation and referring to the drawings:

A large part of the difficulty encountered in leakage of flush tanks is due to improper guiding and centering of the outlet valve, so that it does not properly seat or does not seat at all. Difficulties caused by corrosion and mechanical problems on the guide and the guiding stem are very common sources of trouble.

This situation is aggravated by the fact that the operating lever and the wire extension therefrom often does not directly raise the outlet valve, but pulls at an angle, causing distortion and bending of the stem and guide.

In accordance with the present invention, the outlet valve is freed entirely from guiding above, and is thus deliberately allowed to move around in response to the pull of the operating lever. Reliance is placed on the hydraulic effect of the discharging water acting on a depending guide in the outlet fitting to keep the outlet valve centered. It has been found that this is a distinct improvement over prior art forms, as it tends to make the outlet valve return to accurately centered position regardless of the question of whether the operating lever is positioned directly above the outlet valve center. Thus the device of the invention will meet the conditions in a wide variety of flush tanks without likelihood of bending or distortion under the conditions of service.

As shown in Figure 1, an outlet flush tank **20** is provided with an inlet connection **21** having an inlet valve **22** controlled by a float lever **23** having a float **24**. These features are not in the plane of the section and are shown in phantom simply for placement purposes, as they form no part of the present invention.

An operating handle **25** controls a pivot **26** on which is mounted a flushing lever **27** having openings **28** for engagement with the outlet valve.

In the bottom of the flush tank, an outlet fitting **30** has a conical valve seat **31** upwardly directed on the inside of the tank. The fitting is secured to the tank by the engagement between flange **32** on the fitting and lock nut **33** threaded on the outside of the fitting.

While it forms no part of the present invention, the seat **31** suitably has a seat liner **34** of rubber or the like of annular conical form mounted on the inside of the seat, as well known in the art. This rubber seat liner is particularly significant where a seal is to be made to glass, as later explained.

A flush tank outlet valve **35** suitably of rubber as well known, has an inverted conical outer valve surface **36** which engages against the seat liner **34** when the valve is closed. An insert **37** in the upper center of the valve makes threaded connections with an eye **38** which engages a chain **40** extending above the outlet valve and connected by hook **41** to one of the holes **28** in the operating lever. It is not important in the present invention to employ a hole **28** immediately above the center of the outlet valve, as the valve will in any case center. It is important, however, to allow enough slack in the chain **40** when the valve is seated so that the valve is free from restraint and can respond to the hydraulic effect of the discharging water as it seats.

At the bottom of the valve a tubular centering extension **42** extends down beneath the valve and carries at its lower end chain **43** which aids in centering and in some cases performs the entire centering function.

The depending tube **42** is conveniently secured to the rubber valve by washer **44** inside the valve which locks against a head **45** secured as by cement to the upper end of the tube by a screw **46** passing through the head **45** and threaded into the washer **44**.

The chain **43** is conveniently secured to the bottom of the tube **42** as by hook **47** which has a spiral portion **48** which is forced into the tube and springs out into engagement into the inside of the tube.

Both the valve and the tube are hollow. It is desirable to allow some water to enter the tube through the sides, and this is suitably accomplished by vent openings **50**.

The tube **42** may be somewhat modified as shown at **42'**, where vent openings **50'** extend all along the tube and the bottom chain **43** is held in place by a bottom head **51**, which is secured as by cement to the bottom of the tube.

In operation of the device of Figures 1 and 2 (or as modified in Figure 6), when the flushing lever **27** is raised, the chain **40** raises the outlet valve, but the maximum height to which the valve is raised is not great enough to bring the tube **42** and chain **43** entirely out of the outlet fitting. As water leaves through the outlet fitting it tends to urge the outlet valve to center position, and as the water in the tank lowers and the outlet valve ceases to have any tendency to float which it exhibits when completely surrounded by water, the outlet valve moves down toward seating position. As it does so, water continues to float out of the outlet fitting, and the hydraulic action against the sides of the tube **42** and the chain **43** urges the outlet valve into the center, and it seats centrally guided by the tube **42** and the chain **43**.

For many purposes it is preferable to center the outlet valve by a chain alone, as shown in Figure 3. In this form, the washer **44'** inside the outlet valve suitably has a metallic insert **52** which makes threaded engagement with eye **53** connecting to chain **43** and clamping outside washer **54** against the bottom of the outlet valve.

In operation in this form, the chain is long enough to remain in the outlet fitting when the valve is raised, and as the valve lowers, the sweep of the water against the chain pulls the valve into central seating position.

In Figure 3*a* a variant form of eye **53'** is illustrated. In this showing the eye formation is heart shaped with a chain receiving and centering portion 53^2. The same mode of operation occurs as in the showing of Figure 3 but in Figure 3*a* the chain seating is accentuated, by sloping the sides 53^3 about 45°, the chain can readily slide down the side 53^3 of the eye into seating position in the eye. This occurs when the water flows to close the valve.

The principles of the invention can be used with an electric light bulb as an outlet valve, as shown in Figures 4 and 5. In the embodiment of Figure 4, spring wire arms **55** engage the bulb and have a hook end **56** which connects to chain **40**. The socket end of the electric incandescent bulb is downwardly directed, and tube **42²** is forced over the socket, making a forced fit therewith. Otherwise the device is like the form of Figures 1 and 2 and the electric light bulb acting as an outlet valve seats, engaging on the lowered surface **36'** so that the clamp arms **55** do not touch the valve seat or seat liner.

In the form of Figure 5, the bulb is mounted in the same way as in Figure 4, but the centering chain **43** is connected to the bulb by a dummy socket **57**, internally threaded at **58** to engage the plug **60** on the bulb. The socket has an eye **53'** threaded in the lower end to engage the chain.

In all of these forms, it will be understood that the depending tube or the chain or the tube and chain remains in the outlet fitting when the outlet valve is raised and centers the outlet valve as it is restored. One of the important features is that the outlet valve is laterally unrestrained when it is unseated.

In view of my invention and disclosure variations and modifications to meet individual whim or particular need will doubtless become evident to others skilled in the art, to obtain all or part of the benefits of my invention without copying the structure shown, and I, therefore, claim all such insofar as they fall within the reasonable spirit and scope of my claim.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

In a flush tank outlet valve, a chain, spring arms at one end of the chain, a glass bulb engaged between the spring arms, and having a metal plug at one end, a socket engaged around the metal plug and a further chain connected to the end of the socket remote from the glass bulb.

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